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CONTRIBUTING EDITORS (Continued)

IN THIS ISSUE

Cover Picture: " . . . That we here highly resolve that these dead shall not have died in vain."

Photograph by Dr. Maximilian Toch, F.A.I.C., Fellow of the Royal Photographic Society of Great Britain; Fellow of the Photographic Society of America.

No Politics in Research

UNDER the attractive title, "Technological Mobilization", a proposal was advanced by Senator Kilgore at the last session of Congress that the federal government take over direction of all research and development as a war measure. Government direction means political direction. Research and politics do not mix to advantage.

We have "technological mobilization" for war now, and it is working effectively.

Practically all research workers in this country are engaged full time on war projects and problems. They number about 100,000 men working in 3,000 industrial, university, and government laboratories under the leadership of the ablest scientists and technologists in the nation.

To change the organization, environment and leadership of these men could not but disturb their work, slow up their results and hinder the war effort on the scientific and technologic front.

Why do that?

The Kilgore Bill died with the 77th Congress, but it has been revived and introduced into the new Senate as S.702. All of us should be alert and should oppose it with our full strength.

Gustav Egloff

Modern Science in Russia

Lecture delivered by Professor V. N. Ipatieff, Northwestern University and Director of Chemical Research, Universal Oil Products Company, Chicago, Illinois, at Boston University, Boston, Massachusetts, January 13, 1943.

***By* V. N. Ipatieff, F.A.I.C.**

THE object of the lecture I am about to deliver consists of an analysis of the scientific achievements made in Russia in recent times. My review of Russian scientific activity would be incomplete, however, if I did not touch, even though briefly, on the progress of scientific thought in Russia during the preceding periods.

I am not engaged in politics, and for this reason can freely and without bias, analyze all stages in the development of science in Russia, a country that went through a revolution and great misfortunes and deprivations which undoubtedly affected the growth of scientific ideas and experimental research.

I lived in Soviet Russia for thirteen years and was commissioned to work on the development of the chemical industry in the Presidium of the Supreme Council of National Economy. For a number of years I headed the Scientific-Technical Division of that Council. This division was in charge of the research institutes that served all branches of industry. For this reason, it is not difficult for me to survey the work done by the Soviet Government for the development of science and industry. However, twelve years ago I was obliged to leave U. S. S. R. It would have been a formidable task for me to outline to you all the achievements in the fields of various sciences made in Russia during this period of time. Fortunately, I obtained very valuable information from J. G. Tolpin, who is employed by Universal Oil Products Company on a project of collecting scientific information on the progress in the chemical and petroleum industries in Russia and

who also collects, incidentally, material on other fields of science related to chemistry.

Just as rays of the sun are distributed to all men, rich and poor, good and evil, so also scientific ideas, new discoveries and inventions serve all humanity. Modern means of transportation and communication between nations make every great invention the property of the entire world, and foes as well as friends of the country where the invention was originally made soon use it.

The scientist and the technologist create not only for their own country, but for humanity as a whole, and for the good of the cause they are sometimes obliged to carry out their ideas not in their own country, but in a different land where industry and working conditions make it possible for them to complete their work.

Great discoveries are in many cases made simultaneously by scientists in different countries. By pointing to important research done in Russia it is not intended to claim exclusiveness or absolute priority for Russians in the fields under consideration. It is only emphasized that Russia has always generously contributed her share to the science of the world.

Development of science in Russia dates less than 100 years back. I have to point out here, however, that as early as 200 years ago one of the world's greatest scientists lived in Russia. He was M. V. Lomonosov, a peasant's son, whose ideas and research on the conservation of matter and energy preceded by decades the discoveries of Lavoisier, Joule and others, but whose works were not known to the world because they were written in Latin and not published. In collaboration with his colleague, Academician G. Rikhman, he verified Franklin's explanations of electrical phenomena in nature and Rikhman was killed during an experiment of this character. The genius of Lomonosov may be compared only with that of Leonardo da Vinci.

Lomonosov was not, however, the first scientist who ever lived and worked in Russia. Science and the arts have always existed in Russia and were developed there in a way that could be expected from a comparatively young nation. The countries bordering Russia, such as Germany, have always kept in close touch with its scientific development and we find that as early as 1828 Ph. Strahl published in Leipzig a 514 page book entitled "Das gelehrte Russland," although a glance at the

index shows that much material is missing which should have been included in a modern study of this type. These countries, moreover, also exerted their influence on her scientific work and in turn were benefited by it. Although the influence of the United States on the industry of Russia has been felt increasingly in recent years, Russian chemical literature, however, still quotes largely the German literature. Many Russian researches were known in this country only as they were published in German science journals and their authors were not always recognized as Russians.

It may be of interest to mention that men like Feodor Beilstein, Wilhelm Ostwald, Tammann were born in Russia and started their careers in Russia; they worked in the Russian Academy of Sciences or Russian Universities for many years and Ostwald and Tammann afterwards were invited to go to Germany.

Western Influence on Russian Science

An era of more vigorous advancement of science in Russia began in the 50's and 60's of the 19th Century when a series of liberal reforms were carried out in Russia on the initiative of Czar Aleksander II and serfdom of peasants was abolished. Like a sponge, Russia started to absorb the advancements in science made in the West. Many young and even older people went abroad for study and specialization in the sciences, especially in natural sciences, such as physics, chemistry, physiology, etc. The movement to pursue these studies frequently took the form of an opposition to the government which attempted to distract the youth from socialist ideas by centering the system of education in the gymnasiums around the study of ancient languages, Greek and Latin.

Contact with western science became a great stimulus to the development of sciences in Russia, which, being a young country with negligible means for realization of new scientific ideas in its laboratories, was not slow nevertheless in demonstrating the great potential energy of Russian genius and the ability to create its "own Newtons." The laboratories in which these researches were carried out could in no way be compared with the palaces of science that already had been erected in Europe which I witnessed myself in the 90's when I was sent abroad for advanced study of chemistry.

What kind of people were the pioneers of the sciences in Russia and whence did they come?

When praying to God, the Russian always turns to the east. Let us likewise turn to the east, where we will find the city of Kazan on the Volga, and we will see that there a coterie of Russian scientists was born whose names were perpetuated in the memories of the entire world by their outstanding discoveries. Suffice it to mention the names of Lobachevskii, Zinin, Butlerov, Markovnikov, M. Konovalov and Mendeleev (the last of whom was born in the city of Tobol'sk in Siberia) to recognize this source of the Russian beacons of science.

Permit me to say a word or two about the scientific works of each of these men. Lobachevskii created a new "non-Euclidian" geometry. Zinin's research on organic chemistry enabled him to demonstrate for the first time that nitrocompounds may easily be reduced to amines such as aniline. The well-known German scientist, Hoffmann, who developed the field of organic dyes, stated in a speech that "discovery of this reaction is sufficient merit for inscribing the name of Zinin into the history of chemistry in gold letters."

Butlerov was a student of Zinin, and simultaneously with Kekulé worked on the development of the theory of organic compounds. The school of Russian organic chemists who were his students enriched science by their remarkable studies on aliphatic compounds in general and hydrocarbons in particular.* One of his students, A. E. Favorskii, an outstanding and very well known chemist still active in the U. S. S. R., was my first teacher in chemistry and thus, I am, in the scientific sense, a grandson of the memorable Butlerov. Butlerov's student, V. Markovnikov, pursued studies on Russian petroleum oils through which his name has become known to almost every American chemist working in the petroleum industry. As far as Mendeleev is concerned, his genius is known to every student who had as much as an introductory course in chemistry. Markovnikov's student M. T. Konovalov, may be regarded as the originator of synthesis of nitroparaffins at the close of the 19th century.

Not only in pure science, but in applied sciences as well, Russian

* J. G. Tolpin collects much material on research of Russian chemists pertaining to hydrocarbons, a study of great importance to the petroleum industry.

workers have exerted an enormous influence on the development of various branches of industry. I would like to point out first of all the research of Professor D. Chernov on the structure of steel and its thermal treatment. It was Chernov who indicated for the first time how steel should be thermally treated to withstand high pressures, such as are encountered in artillery guns. The change from bronze to steel guns could be materialized only after Chernov's research at the Obukhov plant in St. Petersburg. Chernov's discovery is valued by the metallurgists of the entire world and Professor Henry Marion Howe of Columbia University carried the following dedication note on the first page of his book "Iron, Steel and Other Alloys," published in Boston, 1903:

"To my friend Professor Dimitry Constantin [ovich] Tchernoff, the father of the metallurgy of iron, as a token of affectionate esteem this work is dedicated."

Early Petroleum Studies

The significance of cracking of oil requires no explanation. It is noteworthy that the Russian engineer Shukhov preceded Burton by publishing a study and patenting a process of cracking oil under pressure.

Preparation of aromatic hydrocarbons from petroleum constitutes one of the most important problems of modern chemical research. It will, therefore, be of interest to point out that as early as 1877 Letni pyrolyzed oil in the presence of carbon and platinized carbon for the purpose of increasing the content of aromatics in the charge. Pyrolysis of oil for the purpose of preparing aromatics was also studied by Rudnev (1881), Nikiforov (1896) and Zelinskii (1915).

In St. Petersburg the first contact method of preparation of sulfuric acid in the presence of a platinum catalyst carried on pumice was demonstrated at the Tentelev Chemical Plant.

The remarkable reaction of addition of water to acetylene in the presence of salts of mercury was discovered by Professor M. Kucherov in the 80's of the last century. Little attention was paid to this discovery for a period of 30 years, until, during the first world war, the Germans began to employ this reaction for the preparation of acetic acid and ethyl alcohol.

Just as much attention is due the Russian achievements in physics

and electrical technology. In 1874 a student of the St. Petersburg University, A. N. Ladygin, experimented with heating metallic wire and small granules of coke by means of electrical current and decided that electricity may be used for illumination purposes. Thus, the first Ladygin electrical lamp was built on this principle. The Imperial Academy of Sciences honored Ladygin with the Lomonosov prize. Simultaneously, Ladygin applied to the Department of Trade and Manufacture for a patent and organized a company for exploiting his invention. Florensov, who later was my professor at the Artillery Academy, and Didrichson further perfected the Ladygin lamp. In 1875 the Ladygin-Didrichson lamp was demonstrated in Paris and tested by the famous Gramm and in Berlin at the Siemens-Halske plant at the same time. Practical use of this lamp was made in 1876 during the construction of the Aleksandrovskii bridge over the Neva. Several other Russian scientists also developed electrical lighting devices at about the same time as Ladygin. Notable among them was Paul Yablochkov, whose carbon arc "candle" was commercially produced on a small scale in 1876. Only toward the end of 1878 the American press carried the news of the incandescent lamp invented by Thomas Edison.

Discoveries in Radiotelegraphy

Another discovery of paramount importance was made by Aleksander Stepanovich Popov, a professor of the Naval Engineering School. This discovery relates to radiotelegraphy, a field that had not yet been explored in his time. All important Russian specialists in this field regard A. S. Popov as the originator of radiotelegraphy. Continuing the research of Hertz, Popov reached a point at which he could receive very faint electromagnetic waves through long distances, which was sufficient as a means of communication. In 1895, A. S. Popov demonstrated before a large audience at the University in St. Petersburg an apparatus for wireless transmission from the chemical laboratory to the physics lecture room in which he presented his work. I was a very young chemist at that time, but I still retain the vivid impression which the very numerous members of the Physico-Chemical Society received at that historic meeting. Popov further perfected his apparatus and in

1897 he was able to operate transmission stations for a distance of 5 km. Unfortunately for Russian science, A. S. Popov soon afterwards died of heart failure.

I would like to point out that the famous Marconi knew about all Popov's experiments, and published his first papers on radiotelegraphy in 1897.

The question may be asked why Popov's invention was not properly utilized in Russia, while Marconi succeeded in developing his discovery in this field to an extent which gave him universal recognition as the creator of radio transmission. Lord Beaconsfield was asked once what the secret of success was. His answer was, "The great secret of success consists in the ability of grasping the opportune moment." However, it is my opinion that this is not the only secret of success. The proper moment can be found for realization of a discovery or invention only when favorable circumstances are available and when the government and the industry are led by people who are capable of evaluating the discovery made. Poor Popov received in answer to his request for a grant of 35,000 rubles for an experiment to establish a communication line between St. Petersburg and Kronstadt or Moscow only 5,000 rubles. Conditions of which this incident is typical are certainly not conducive to development of research and transmitting it into commercial practice.

On the other hand the electrical industry in Russia was at that time in an embryonic state and could not afford the means for the development of a new branch of electrical technology. Even the incandescent lamps used in Russia were not made in Russian factories. Instead, they were supplied by German firms.

Natural Resources Unappreciated

It may be of interest to cite an example of the lack of understanding on the part of Russian industrialists of the potentialities offered by the country's resources. Prof. D. K. Chernov discovered in Southern Russia an enormous deposit of rock salt. After resigning from the Obukhov steel plant in St. Petersburg, Professor Chernov settled in the South, in the Bakhmut county of Ekaterinoslav province, where he studied the location of the salt deposits and lakes and explored the salt strata by drilling. For a long time he attempted to persuade industrialists in St. Petersburg and Moscow to subsidize this work and to begin industrial

utilization of the salt, but his attempts failed. Thanks to his compelling energy, he did not drop the project. He turned to foreign firms and enlisted the aid of Dutch capital, by which means an enormous development of the salt industry in that region soon became a fact.

Concerning those industries which reached a state of independence, such as the sugar, textile and others, numerous examples can be cited of the state of perfection to which we developed industrial methods brought from the West which sometimes astonished foreigners.

Other Scientific Achievements

Let us also refer to scientific achievements of Russian scientists in other fields in which some Russian names are well known. These include mathematics (members of the Academy of Sciences Chebyshev and Lyapunov), physiology (Sechenov and the famous I. Pavlov Mechnikoff) agriculture (Vinogradskii, Dokuchaev and Pryanishnikov).

The beginning of the 20th century marked the development of catalytic chemical reactions. Simultaneously and independently, new ways were found in France and in Russia which were destined to direct the future development of science as well as technology. It may be said that the era of catalysis was reached in organic synthesis. Immediately, industry started a revision of all previous scientific research in which catalytic phenomena have been as much as hinted. These works were studied and as soon as possible the results were brought into commercial practice. While the French scientist Sabatier studied catalytic hydrogenation of organic substances under the action of reduced nickel, the present author discovered new catalytic reactions, including dehydrogenation, dehydration, polymerization and isomerization. I was able to discover that metal oxides constitute perfect catalysts for many reactions. Furthermore, the enormous significance of the pressure factor in catalytic processes was demonstrated for the first time and an apparatus constructed known as the bomb which permits safe laboratory experiments under several hundred atmospheres pressure.

All these discoveries which were made in a period of 4-5 years facilitated the introduction into industry of new processes, such as the synthesis of ammonia under pressure from nitrogen of the air and hydrogen done by Haber, synthesis of methyl alcohol from carbon monoxide and hydrogen (carried out by Patar), synthesis of gasoline from tars and

coal, practiced now by the German I. G. Farbenindustrie, and, finally, pressure hydrogenation of various organic compounds which could not be hydrogenated without pressure by the method of Sabatier. Thus, ideas and laboratory research done in Russia served as a basis for development of new chemical processes from which humanity benefited in peacetime and which are an extreme necessity in modern warfare.

The war of 1914 found Russia completely unprepared from the chemical point of view. The chemical industry was very limited and only the most essential chemical products were manufactured in Russia, such as inorganic acids, soda, ammonia, sodium hydroxide, etc., and of organic compounds alcohol, glycerine, soaps and explosives. All dyestuffs, pharmaceuticals and other organic preparations were imported from Germany. It is true that the government attempted to practice a tariff policy designed to develop the domestic chemical industry, but this was done in a very ineffectual way and hardly remedied the situation.

Curious incidents may be cited in this connection. For instance, the war ministry wanted to be assured that trinitrotoluene used as an explosive should be made of domestic material and in its contracts with industrial firms insisted that domestic toluene be used. However, they paid no attention to the source from which the toluene was obtained, and while toluene was actually produced in Russia, it was obtained from so-called "crude benzol", a product of coal coking, the entire supply of which was imported from Germany. The domestic industry was limited in this case to the distillation of crude benzol and the preparation of a fraction containing toluene. In 1914 at the beginning of the war with Germany, Russia produced no crude benzol as a coking product and found itself without toluene, a fact which was very well known to the enemy.

Emergency Problems

Another shining example of mismanagement in Russian industry is the case of potash. Crude potash was produced in Russia before the first world war by burning enormous quantities of sunflower plants after removal of the seeds. This crude potash was sold for a trifle to Germany and refined potash bought from Germany at a high price.

All this illustrates the difficult problem with which we chemists were faced when charged with the responsibility of organizing new branches

of the chemical industry and assuring the army of a supply of explosives, poison gas, etc. We succeeded in constructing within two or three years of the war more than 20 plants producing crude benzol from coal coking and pyrolysis of petroleum oil to obtain benzene and toluene in large amounts. A series of plants were built producing sulfuric acid, nitric acid and explosives.

The success of this work was made possible only by the well founded chemical and technical training received by the Russian chemists and engineers under teachers whose names are known throughout the world and who created an independent Russian school of chemists.

War is a test of a nation, and all faults in state functioning are most obvious during a war. However, the genius of a people and its potential strength also come to the fore.

In 1917, during the war, the great revolution broke out in Russia, as a consequence of which not only was Russia forced to interrupt all military operations and to conclude peace with Germany, but also to change the entire economic structure of the country. The civil war and the attendant lack of raw materials and fuel shut down many plants. Disorganization of the transport starved cities and villages of Russia.

An idea of the drop in the efficiency of plants and factories may be given by the following example: In 1913, about 270 million puds (4½ million tons) cast iron were produced. In 1921, this amount dropped to only 9 million puds (150 thousand tons). Under these conditions, scientific research came to a halt in the frozen laboratories of the universities and the institutes.

The New Economic Policy

Realizing that ideas of "military communism" cannot be carried out under peacetime conditions and acknowledging his miscalculations Lenin, being a great man, decided in 1921 on a sharp turn in the government policy and created the New Economic Policy (N.E.P.). He called in outstanding experts to work for the restoration and expansion of industry and agriculture, hand in hand with communists who ruled the country. At this time I was made a member of the Soviet government and charged with the duties of managing the entire chemical industry and all scientific institutes which were to stimulate the further development of Soviet industry.

Remarkable results were achieved by this turn in the governmental

affairs, but the incurable illness and later death of Lenin made it impossible to carry through all the measures outlined by him in his decree introducing the new economic policy as a basis for development of the well being of Russian citizens.

Compulsary Education

Since I headed, for a long time, the scientific-technical division of the Supreme Council of National Economy and also participated in the meetings of the commissariat of education, I was in touch with the development of the educational work in Soviet Russia. Having acquired the power, the communist decided that illiteracy should be wiped out, which was beyond a doubt a correct decision. A decree was immediately published making education compulsory. It must be remarked, however, that even before the war of 1914, as early as 1910, universal compulsory education was decided upon in principle and in 1922 illiteracy was expected to disappear in Russia. The execution of this measure was drawn out for several years only because of a lack of teachers for village schools. In 1916, 91% of all children dwelling in the cities were in schools. Only a small percentage of city dwellers remained illiterate, for the most part, old people.

Concerning higher education, the Soviet government made the college grade schools easily accessible to everybody. At first the access was perhaps too easy, since every citizen 16 years of age or over could enter a school for higher education without any examination. However, this tribute to the revolution was short-lived, because the complete failure of this measure soon became evident. In order that universities and higher technical schools could perform their functions, adequate secondary school education of the students was necessary. In their great desire to make the academic work of secondary school students as easy as possible, a new system of instruction was introduced, sharply different from that previously employed in Russia and other countries. However, the experience of several years demonstrated the necessity of a change. The schools for the most part returned to the program of the old Russian school which gave well prepared students to the universities.

As long as the new system of instruction was experimented with in the secondary schools, the administration of the schools for higher

education constantly complained of the backwardness of the students because they received a very poor preparation; this condition was not limited to subjects such a mathematics and physics; many couldn't even write correctly and express their thoughts in writing. Success of college education began to show continuous progress as soon as the methods of secondary school education were changed.

The desire for education is enormous among present day Russian youth, and despite the difficult living conditions in large cities the students are ready to suffer all privations of their big city life in order to obtain higher education and become instrumental in the progress of industry and agriculture. The Soviet government has now opened all the schools to all citizens of the U. S. S. R., regardless of whether they are or are not members of the communist party, whether they come from the former bourgeoisie or are sons of peasants or workers.

It may be remarked here that during the czarist regime also the secondary schools, such as gymnasiums and real schools, as well as universities, were open to all classes of the population. I was a student in the Third Military Gymnasium in Moscow and shared my school desk with students of whom one was the son of a count and one the son of a small merchant; a third was a peasant's son. My children went to the Eleventh Gymnasium in St. Petersburg which was located in the Vyborg district populated by workers; ninety-five per cent of all students of that gymnasium were children of workers, small tradesmen, porters, and only five per cent were children of officials in the civil service. The gymnasiums in the cities had, however, few children of workers and peasants, owing to the high tuition fees in both the secondary schools and universities, and to the expense of maintaining a student in the city if he had no relatives to stay with. Proficient students of the secondary school in need of financial assistance, however, could receive scholarships. This covered about ten per cent of the students.

At first the Soviet government abolished tuition fees in all schools. In addition, scholarships were freely granted but later the government introduced fees, first in the higher educational institutions and later also in the secondary schools.

Research Institutes

A great achievement to the credit of the Soviet government's effort to develop industry was the founding of a large number of research institutes designed to serve science as well as industry. It was recognized by the government that without preliminary investigation of physical and chemical processes in the laboratory no large scale production can be undertaken. In 1921, when the present author took over the management of the institutes responsible to the scientific-technical division of the Supreme Council of National Economy, some of the institutes had a record of activity begun before the revolution and others were only in the state of formation. For instance, the Institute of Applied Mineralogy was started with a small laboratory founded before the war of 1914 by V. V. Arshinov, who was a son of a rich Moscow merchant greatly interested in collecting minerals and later became a professor. In his house in the Pyatnitskaya Street, Arshinov assembled an interesting collection of minerals and some apparatus for their investigation. Furthermore, he collected also a voluminous library on mineralogy. Arshinov offered to the scientific-technical division his laboratory and thus a new institute was born. A few years later, in 1928-1929, we succeeded in obtaining from the Soviet government an appropriation for the construction of a research institute of geology and mineralogy and to equip it in accordance with present day scientific requirements.

In a similar way the Institute of Fertilizers was organized and developed. At the very beginning of the revolution in 1919, an institute for study of fertilizers was organized at the initiative of Professor Ya. V. Samoilov in a small private house in Moscow on the Tikhvinskaya Street. This institute was also transferred to the jurisdiction of the scientific-technical division. The great importance of research on fertilizers for Russia as an agricultural country required organization of a large institute to cover this field, and after proper presentation to the government a new building for the Institute of Fertilizers was constructed in 1930-1931 along with the Institute of Mineralogy. In a short span of time, the new institute amortized the expenses incurred in its organization. It is sufficient to point out that at this institute methods were developed for manufacturing fertilizers from apatite ores

coming from the newly prospected extensive Khibinsk deposits in Lapland, the largest deposits of this mineral in the world. In 1932-1935, this institute also prospected new enormous deposits of phosphorites in Middle Asia in the Kara-Tau mountains. The resources in that locality are not smaller than those in Lapland.

L. Ya. Karpov, a member of the Executive Presidium of the Council of National Economy, took the initiative as early as 1919 in organizing a small laboratory in a private house in the Armenian lane in Moscow for the purpose of serving the chemical industry. A. N. Bakh, who had just returned to Russia from Switzerland, where he spent most of his life as an emigrant, was engaged to direct the laboratory. It soon became evident that this laboratory could not serve the entire chemical industry and it was decided in 1920 to build a new laboratory. Despite the great difficulties in construction and the lack of materials, the Karpov Institute was opened in 1921. It was very well equipped and industry greatly benefited from the research being carried out there.

The number of State Institutes increased each year as the various branches of industry progressed and they reached 20 in the 1920's. Furthermore, the industrial trusts (organizations created by the government for the purpose of managing the various industries) also tried wherever possible to organize institutes and laboratories for the control and improvement of their own production.

In 1935 the People's Commissariat of the heavy industry published a book describing the research institutes, their objects of study and the personnel responsible for their work. According to this information the heavy industry was served by 99 institutes and 27 subordinate divisions. All these institutes are subdivided into two groups. The theoretical (principal institutes) were directly responsible to the research department of the Commissariat and the institutes serving a specific branch of the industry were subordinate to the general management of that industry. The following gives a more detailed subdivision:

Research Institutes

Branch	Number of Institutes	Branch Divisions	Total
Physics	6	—	6
Chemistry (including coal Chemistry)	27	5	32
Fuel	5	2	7
Energetics	7	1	8
Electrotechnics	6	—	6
Ferrous Metallurgy	6	—	6
Non-ferrous Metallurgy	5	—	5
Mining	4	10	14
Geology and Geodesy	3	2	5
Machine Building	14	3	17
Building Construction	12	3	15
Organization of Labor	4	1	5
Total	99	27	126

These institutes were served by a total of 33,380 people, of which 11,189 (33.5 per cent) were scientific personnel, 9,358 (28.1 per cent) technicians, engineers and laboratory assistants and 12, 833 (38.4 per cent) were classified as service personnel and workers.

For the purpose of preparation of scientific personnel in the U. S. S. R., a school of "aspirants" was founded in each university, research institute and also in the Academy of Sciences. In 1935, the number of aspirants was 450. The budget of all institutes for 1934 amounts to 269,000,000 Soviet rubles, of which the state appropriated 38,000,000 rubles and the rest was covered in the main by industry. It is beyond doubt that this organization of research institutes will be in the future of invaluable help in the development of science in the country, as well as introduction of new processes and perfection of old methods used by the industry.

If a parallel is drawn between the development of the activity of these institutes from their inception with the development of Soviet industry, the necessity of such an organization of institutes for a socialized industry will be confirmed. When the state was run on a capitalist

basis, research laboratories of this type were founded in Russia by private industrial organizations, in rare cases by associations of industrialists. However, they certainly lacked the wide scope embracing an entire branch of industry which characterizes the institutes organized by the state.

Industrial Chemistry

It would be an impossible task to give in this lecture even a general outline of all the achievements of Soviet science and industry during the 25 years of existence of the Soviet government. Only some most pertinent facts may be pointed out. As the most outstanding achievement in the field of applied chemistry may be regarded the industry of nitrogen fixation, which reached a size completely sufficient to satisfy the needs of agriculture as well as military needs. The output of other basic chemical industries also showed a very extensive growth. Concerning the fine chemical industry, such as production of pharmaceuticals and dyes, this proceeds at a slower tempo, which, however, is a quite normal course because a successful development of these industries requires a long period of training of a school of chemists. I recall in this connection a conversation with Trotsky in 1925 in which he asked, "When will we have a dye industry such as the Germans possess?" to which I replied, "If we will develop the dye industry without any assistance, it will require about 25 years." "This is hyperbole!" Trotsky exclaimed.

The pharmaceutical industry greatly benefited by the researches of A. E. Chichibabin, Orekhov and others in the field of alkaloids.

Toward the end of the 1920's, I. Preobrazhenskii discovered large deposits of potassium salts in the Perm Guberniya. The very extensive resources of potassium salts available in U. S. S. R. at the present time are sufficient to cover the entire needs of agriculture as well as the chemical industry.

The necessity to develop a synthetic rubber industry was pointed out by Lenin at the very beginning of the revolution. This was attempted first by Professor S. Byzov, who prepared butadiene by pyrolysis of oil and polymerized the butadiene in the presence of catalysts. Several years later, in 1928 and 1929, Professor S. V. Lebedev systematically investigated preparation of butadiene from ethyl alcohol under the action

of mixed catalysts and increased the yield of this hydrocarbon obtainable by the above method to such an extent that industrial application of the process appeared feasible. About 100,000 tons butadiene from alcohol are being annually produced at the present time in U. S. S. R.

Furthermore, an extensive investigation of the flora of U. S. S. R. was undertaken and a number of the most promising rubber-bearing and gutta percha-producing plants collected (tau-sagyz, kok-sagyz).

The theory and practical application of various catalytic reactions constitutes a subject of constant study in various institutes of U. S. S. R. Much work on this subject is being done at the Institute of High Pressures by Moldavskii. The research of V. V. Ipatieff, Jr. on corrosion of metals under pressure and solubility of gases in liquids under pressure and of A. I. Dintses and A. V. Frost on application of thermodynamics to cracking of oil is to be mentioned which yielded many valuable data.

The L. Ya. Karpov Institute of Physical Chemistry also pays much attention to research on catalysis, and valuable data on the theory of catalytic processes were published by A. N. Bakh, A. N. Frumkin studies electrode processes and surface phenomena, Ya. K. Syrkin investigates application of physics to organic chemistry. N. N. Semenov heads the Institute of Chemical Physics and has been responsible for the development of the chain theory of chemical reactions, theories of combustion and detonation.

Likewise, many important researches on all branches of chemistry were carried out in the universities and technical colleges, beginning with 1921. Chemists in all countries have noted the research of N. D. Zelinskii, A. E. Favorskii, Nametkin, Yur'ev and many others.

Research in Physics

In the field of physics, the research of Professor L. Mandelstam and G. Landsberg may be pointed out, who observed scattering of monochromatic radiation by quartz, which led them to the discovery of the phenomenon known as the Raman effect. This discovery was made by them almost simultaneously and independently of Raman.

Before the revolution, no optical glass was produced in Russia. The Optical Institute, the activities of which began in 1918, attracted important scientists, including the Academicians Grebenshchikov, Vavilov,

Preobrazhenskii, corresponding member of the Academy Kachalov and a number of professors. These collaborators of the Optical Institute showed a brilliant performance in solving the problem of production of optical glass. At the present time this research institute is one of the leading institutions in the world working in the field of optics with respect to the volume of the work done and the variety of problems studied.

Research of the Academician Kapitza, a student of Rutherford, is known throughout the world. In 1934, Kapitza constructed in his laboratory in Cambridge a machine for liquefying helium by its expansion performing external work. This machine makes it possible to produce very low temperatures with more convenience and without the use of liquid hydrogen for preliminary cooling. A machine of this type is being operated at the present time in U. S. S. R. with the aid of which liquid helium is produced on a commercial scale.

Briefly, Kapitza's method consists of precooling compressed helium gas at some 30 atm. pressure by the use of liquid air boiling under reduced pressure at about 65° K. The cooled gas is then made to do work in a specially designed engine, the exhaust gas being interchanged with the incoming gas until an equilibrium temperature of 10° K is attained. About 5% of the total gas flow at this temperature is subjected to Joule-Thomson expansion with suitable interchange and brought to liquefaction. The method is therefore unique insofar as the usual liquid hydrogen stage is omitted, thereby removing explosion hazard and materially reducing the cost of the equipment.

The activities of the Central Aero-Hydrodynamical Institute must be mentioned which was named after Professor Zhukovskii. This institute performed a great service in the research on flying. Professor Zhukovskii and his co-workers in the chief management of the air fleet took the initiative in 1917 in the organization of this institute. At that time the group was known as the "Aviation and Testing Bureau." In 1918, this bureau was reorganized into an institute headed by Zhukovskii and after the death of the latter, Academician Chaplygin became the leader of the theoretical research of this organization. The work of the institute embraces all important problems of aeroplane construction

and investigates aerodynamical phenomena in the laboratory, using models flown in an artificial draft. A staff of competent students of aerodynamics was assembled at the institute, and as a result numerous scientific achievements in aeronautics and hydrodynamics were brought about, for which G. G. Kul'man, V. P. Vetchinkin and especially the corresponding member of the Academy of Sciences A. N. Tupolev are known as the most talented co-workers of this group.

Scientific Expeditions

Being unable to list even in brief the outstanding research in other fields of science, I think it necessary, nevertheless, to mention organization of a number of expeditions for the purpose of scientific study and investigation of mineral resources. These expeditions made great contributions toward development of Russian industry, and as a result new industries were created, such as mining of potassium salts, rare elements and large scale development of phosphate fertilizers. The expeditions to Pamirs headed by Academician Yu. Shmidt and his investigation of navigation routes in northern Arctic Ocean are generally known throughout the world. The fearless journey of Shmidt and his co-workers from Cape Cheluskin to the shores of America was followed breathlessly in Russia. Just as important are the scientific accomplishments of other Russian exploration parties in the Arctic Regions where 57 stations for scientific observation were maintained by the Soviet government in 1939. In that year alone Soviet pilots flew over 1,000,000 miles in the Arctic; the flight of M. V. Vodopyanov over the Kara Sea on May 24, 1939 provoked world wide interest.

In conclusion, it is to be acknowledged that many achievements made in Russia, as indicated above, found application also in other countries. Suffice it to say that polymerization of olefin hydrocarbons discovered in Russia by the author was developed in the United States and made possible manufacture of 100 octane gasoline which is so acutely needed today for military aviation.

The information on the work going on in the research laboratories of U. S. S. R. at this time of war is very meager. However, even these accidental bits of information indicate that scientific ideas born in the minds of Russian scientists are not permitted to come to a standstill. Research is being continued; for instance, a powerful cyclotron for

utilizing atomic energy was recently installed in Kazan. Scientific effort is being generally directed to serving the needs of the Army and Navy.

There is no doubt that after this war the research workers of the numerous Russian institutes will resume the development of their work on problems the solution of which will raise the cultural life of the entire humanity in all countries to a higher plane.

Alfred Nelson Finn

THE AMERICAN INSTITUTE OF CHEMISTS records with deep regret the death of Alfred Nelson Finn on September 21, 1942, in Lincoln, Nebraska.

Mr. Finn was born on August 10, 1882, at Denver, Colorado and was educated at the University of Denver from which he received the A.B. and A.M. degrees. He instructed in chemistry at the University of Denver from 1909 to 1911. From 1911 to 1919 he was chemist with the United States Bureau of Standards, and from 1919 to 1920 served the Hydraulic Steel Company of Cleveland, Ohio as chief chemist and metallurgist. From 1920 until his retirement, about six months ago, he was chief of the glass section of the National Bureau of Standards, Washington, D. C. Mr. Finn was in charge of the bureau's production of optical glass and of the making of reflectors for astronomical telescopes.

He was author of several articles published in the technical journals on the subject of optical glass and glass technology in general. Among his scientific society memberships were the American Chemical Society, The American Ceramic Society, The Optical Society of America, The American Society for Testing Materials, and the Washington Academy of Science. He became a member of the American Institute of Chemists in 1938.

COUNCIL

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President, Gustav Egloff
Vice-president, Donald Price
Secretary, Howard S. Neiman
Treasurer, Walter J. Murphy

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Frank G. Breyer
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Charles N. Frey
Frank O. Lundstrom
Robert J. Moore
Foster D. Snell
W. D. Turner

CHAPTER REPRESENTATIVES

New York	*Niagara*	*Philadelphia*	*Washington*
Marston L. Hamlin	A. W. Burwell	Gilbert E. Seil	Albin H. Warth

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A MEETING of the National Council of The American Institute of Chemists was held on Friday, December 11, 1942, in the New York offices of Universal Oil Products Company, Room 5222, 50 West 50th Street, New York, N. Y., at 4:00 p.m.

President Gustav Egloff presided. The following officers and councilors were present: Messrs: E. R. Allen, S. R. Brinkley, G. Egloff, H. L. Fisher, M. L. Hamlin, W. J. Murphy, H. S. Neiman, D. Price, W. D. Turner, A. H. Warth. Mr. L. W. Hutchins, Dr. E. H. Northey, and Miss V. F. Kimball were present.

Upon motion made and seconded, the minutes of the meetings held on October 1, 1942, and October 23, 1942, were approved.

The Secretary was requested to send out additional bills for outstanding dues.

The Treasurer's report, showing cash on hand and in bonds and banks totaling $4,828.00 with Chapter refunds payable of $213.18, was read and accepted.

Dr. Northey reported as chairman of the Committee on Constitutional Revision. After discussion, the following motion was made: That the years of experience for Associates shall be five. Motion lost.

Upon motion made and seconded, it was decided that three years of experience be required for Associates.

The report as submitted by the Committee on Constitutional Amendments with the above mentioned change with regard to the years of experience required for Associates was adopted, and the Secretary was advised to notify the members of the amendments to the Constitution as proposed by the National Council to be submitted to the next annual meeting for action.

Mr. L. W. Hutchins made some suggestions for publicity of interest to the Institute: 1. Publicity on meetings of the various chapters, more easily secured if copies of talks can be secured in advance. 2. Constitutional changes where they affect membership ranks should be publicized. 3. The matter of professional standing or licensure deserves publicity, and in addition a leaflet on this subject might be prepared. 4. The membership brochure would be useful to acquaint nonmembers with the Institute.

Dr. Egloff stated that there should be a periodicity in our publications, and that misinformation about the Institute should be corrected by frequent statements about our objectives.

Dr. Egloff presented a copy of Senate Bill 2721, introduced in the United States Senate for Senator Kilgore of West Virginia, which calls for "Technological Mobilization", together with a letter from Senator Kilgore. Dr. Egloff also read his reply to this letter. After discussion, the editor was instructed to publish the correspondence and the bill in the next issue of THE CHEMIST.

Upon motion made and seconded, the Council approved Dr. Egloff's stand in his letter to Senator Kilgore, and instructed that Senator Kilgore's letter, Dr. Egloff's reply and the bill be printed for the information of our membership.

Dr. Albin H. Warth was appointed Chairman of the Committee on Interrelations.

Upon motion made and seconded, the following new members were elected.

FELLOWS:

Bull, George G.
(1942), *Major,* U. S. Army, A.A.S. O.C.D. Camp Davis, North Carolina.

Burright, Ora B.
(1942), *Nutritionist and Home Economist, Writer.* Room 615, 110 West 42nd Street, New York, N. Y.

Cohan, Leonard H.
(1942), *Chief Chemist,* Continental Carbon Company, 6130 W. 51st St., Chicago, Illinois.

Fibel, Lewis R.
(1942), *Chemist,* William M. Grosvenor Laboratories, 50 East 41st Street, New York, N. Y.

Landis, Walter S.
(1942), *Vice-president,* American Cyanamid Company, 30 Rockefeller Plaza, New York, N. Y.

Miskel, John J.
(1942), *Manager,* New Product Analysis Department, National Oil Products Company, Harrison, N. J.

Patrick, William H.
(1942), *Development Chemist,* American Cyanamid Company, Stamford, Connecticut.

Reed, Burleigh
(1942), *Professor,* Head Department of Chemistry, Washburn Municipal University, Topeka, Kansas.

Rust, John B.
(1942), *Vice-president,* Montclair Research Corporation, 4 Cherry St., Montclair, New Jersey.

Schaar, Bernard E.
(1942), *President,* Schaar and Company, 754 West Lexington Street, Chicago, Illinois.

Wezmar, John
(1942), *Chemist,* E. R. Squibb and Sons, New Brunswick, N. J.

ASSOCIATES:

Goldberg, Joseph M.
(A.1942), *Control and Development Chemist,* Molnar Laboratories, 211 East 19th Street, New York, N. Y.

Nee, John W.
(A.1942), *Chemist,* Roxalin Flexible Finishes, Inc., 800 Magnolia Avenue, Elizabeth, New Jersey.

JUNIORS:

Cole, Albert J.
(J.1942), *Research Chemist,* Triumph Explosives, Inc., Elkton, Maryland.

DiMatteo, Eliseo A.
(J.1942), *Research Chemist,* Aerovox Corporation, New Bedford, Mass.

Vogenitz, Frederick O.
(J.1942), *Plant Superintendent,* Integrity Paint Company, 294 State Street, New Haven, Conn.

Upon motion made and seconded, the following former members were reinstated to membership:

FELLOWS:

Bullock, Edmund R.
(1942), *Research Chemist,* Eastman Kodak Company, Rochester, N. Y.

Berl, Ernst
(1942), *Research Professor,* Carnegie Institute of Technology, Pittsburgh, Pennsylvania.

Upon motion made and seconded, the following changes in rank were granted:

Doede, Clinton M.
Raised from Associate to Fellow.

Serbia, Gonzalo R.
Raised from Junior to Fellow.

Brown, Alfred E.
Raised from Junior to Associate.

Kuti, Albert J.
Raised from Junior to Associate.

Sieminski, Mitchell A.
Raised from Student to Associate.

Upon motion made and seconded, May 15, 1943, was selected as the date of the next Annual Meeting, to be held in Chicago, Illinois.

There being no further business, adjournment was taken.

January Meeting

A meeting of the National Council of THE AMERICAN INSTITUTE OF CHEMISTS was held on Friday, January 8, 1943, in the New York office of Universal Oil Products Company, Room 5222, 50 West 50th St., New York, N. Y., at 4:00 p.m.

In the absence of President Egloff, Vice-president Donald Price presided.

The following officers and councilors were present: Messrs: E. R. Allen, S. R. Brinkley, H. L. Fisher, C. N. Frey, M. L. Hamlin, H. S. Neiman, D. Price, M. Toch, and W. D. Turner. Miss V. F. Kimball was present.

Upon motion made and seconded, the minutes of the previous meeting were approved.

Upon motion made and seconded, the following new members were elected:

FELLOWS:

Abernethy, Raymond J.
(1943), *Chief Chemist,* Coroner's Office, L. A. County, 101 Hall of Justice, Los Angeles, California.

Beyt, Maurice S.
(1943), *Research Chemist,* Universal Oil Products Company, 310 S. Michigan Avenue, Chicago, Illinois.

Coppoc, William J.
(1943), *Chemist*, The Texas Company, 2329 Sixth Street, Port Arthur, Texas.

Corbin, Milford H.
(1943), *General Manager*, Toch Brothers and Standard Varnish Works, 2600 Richmond Terrace, Staten Island, New York.

Gibson, George,
(1943), *Assistant Professor of Chemistry*, Illinois Institute of Technology, 3300 Federal Street, Chicago, Ill.

Lougovoy, Boris N.
(1943), *Chief Research Chemist*, American Chicle Company, 30-30 Thompson Avenue, L. I. C., N. Y.

Luaces, E. L.
(1943), *Consulting Chemical Engineer and Patent Solicitor*, Toumlin Building, Dayton, Ohio.

The matter of the Kilgore Bill was brought up, and the secretary was requested to obtain two copies of "The Professional Engineer". It was suggested that all scientific people be organized to oppose this Bill, and upon motion made and seconded, the Secretary was requested to write to the appropriate committee of the American Association for the Advancement of Science, and to send them copies of THE CHEMIST and of the "Professional Engineer". The Secretary was also requested to write to Dr. C. G. King of the Nutrition Foundation, Chrysler Building, New York, N. Y., to Dr. W. H. Gardner, and to the American Institute of Physicists.

There being no further business, adjournment was taken.

New Applications For Membership

For Fellows

Carodemos, Peter P.
Associate Professor of Chemistry, Clemson College, Clemson, So. Car.

Dorris, Thomas B.
Research Chemist, Franklin Research Company, 5134 Lancaster Avenue, Philadelphia, Penna.

Erickson, Harry J.
Chief Chemist, Assistant Superintendent, Aurora Gasoline Co., 12800 Northampton St., Detroit, Michigan.

Geiser, William B.
Chief Chemist, New York Central System, 541 East 152nd Street, Cleveland, Ohio.

Gleave, Rex O.
Chief Chemist, Inland Empire Refineries, Inc., Box 6188, Hillyard Station, Spokane, Washington.

Kozak, V. J.
Chemist, American Cyanamid and Chemical Corporation, Research Laboratories, Stamford, Conn.

Lee, George Fletcher, Sr.
Analytical and Consulting Chemist, 215 Franklin Street, Johnstown, Pa.

Levine, Morris
Chemist, Danciger Oil and Refining Company, Tulsa, Oklahoma.

Moore, Norman Hall
Chief Chemist, Indian Refining Co., Lawrenceville, Illinois.

Peabody, William Alden
Research Director, Valentine's Meat-Juice Company, 1600 Chamberlayne, Richmond, Virginia.

For Junior

Holler, Albert Cochran
Chemist, United States Metal Products Co., P. O. Box 1067, Erie, Pa.

To be Raised from Junior to Associate

Butcosk, Richard A.
Research Chemist, International Lubricant Corporation, New Orleans, Louisiana.

New York

Chairman, Elmore H. Northey *Vice-chairman,* Paul J. Witte

Secretary-treasurer, A. Lloyd Taylor
Oakite Products Company, 22 Thames Street
New York, N. Y.

Council Representative, Marston L. Hamlin

A meeting of the New York Chapter was held at the Chemists' Club, New York, on January twenty-ninth, at which the speaker was Dr. Howard I. Cramer, of Sharples Chemicals, Inc. His paper, "Synthetic Rubber", will be printed in an early issue of THE CHEMIST.

Niagara

Chairman, L. M. Lawton *Vice-Chairman,* George W. Fiero

Secretary, Margaret C. Swisher

Department of Chemistry
University of Buffalo
Buffalo, New York

Council Representative, Arthur W. Burwell
Carl H. Rasch, *Alternate*

Pennsylvania

Chairman, J. M. McIlvain *Vice-chairman,* Maurice L. Moore

Secretary-treasurer, Clinton W. MacMullen

6650 Large Street
Philadelphia, Penna.

Council Representative, Gilbert E. Seil

News Reporter to THE CHEMIST, Kenneth A. Shull

THE first meeting of the current year was held at the Central Y. M. C. A., 1421 Arch Street on Tuesday, October twenty-seventh.

In the absence of the Chairman, Mr. J. M. McIlvain, Dr. Edward L. Haenisch presided at the meeting.

The following committees were appointed to serve during 1942-43: Executive Committee, Mr. J. M. McIlvain,

Dr. Maurice L. Moore, Dr. Clinton W. MacMullin, Dr. Gilbert E. Seil, Mr. Kenneth E. Shull, Dr. Edward L. Haenisch, Dr. Harold L. Olson, Mr. Harold A. Heiligman, and Dr. James F. Couch; Program Committee, Dr. Maurice L. Moore, Chairman; Membership Committee, Dr. James F. Couch, Chairman; Dinner Committee, Dr. Harold M. Olson, Chairman.

The principal speaker of the evening was Mr. Hobert Kraner, Research Engineer with the Bethlehem Steel Corporation who presented "Unusual Patents Granted by the U. S. Patent Office".

For many years Mr. Kraner has been collecting freak and amusing patents as a hobby, and he has assembled them into a very interesting lecture and demonstration.

It is surprising that the Patent Office should grant patents for such things as a bed wired to electrocute bed bugs; a farm machine designed to conserve water by injecting an icicle at the base of each vegetable, and a tapeworm trap which is baited, attached to a string and swallowed, whereupon Mr. Tapeworm sticks his head inside and is caught. The "patient" then pulls up the trap, tapeworm, and all.

It need hardly be added that the members of the Pennsylvania Chapter were practically rolling in the isles during the course of this hour and a half presentation.

A meeting of the Pennsylvania Chapter was held on Tuesday, November twenty-fourth at the Central Y.M.C.A.

At the close of an informal dinner, Dr. Maurice L. Moore, research chemist with Sharpe and Dohme, spoke on "Chemotherapeutic Agents of Microbial Origin."

Some time ago it was found that cattle with tuberculosis would pass the organisms in their feces. Subsequent examination of the soil failed to show the presence of tuberculosis germs. This led to the belief that some bacteria-destroying substance must be present in the soil.

Research finally disclosed the fact that certain soil organisms are capable of producing antiseptic substances which possess the ability to destroy other unrelated species. Two of the substances thus far isolated are: (1) penicillin, from a mold; and (2) gramicidin, from B brevis. Both of these agents are effective against gram positive species such as *Staph. Aureus*

The main speaker of the evening was Mr. John A. Tauber, Technical Division, E. J. Lavino & Co., whose topic was "The Industrial Applications of X-Ray Diffraction".

Mr. Tauber introduced his talk by discussing some of the fundamental theory of X-Rays and X-Ray diffraction.

X-Rays were discovered by Röntgen in 1896. They are produced by allowing the rays emanating from the cathode in a vacuum tube to fall upon a metallic anode. X-Rays travel in straight lines, are unaffected by a magnetic field, and to some extent are capable of penetrating all substances.

Laue and his successors showed that the atoms in a crystal act as a three-dimensional diffraction grating toward X-Rays. Further, if the rays are allowed to pass through a crystal and then to impinge upon a photographic plate a picture will result, showing a central spot due to the action of the

primary rays and a series of symmetrically grouped spots due to the diffracted rays.

Bragg developed a method of X-Ray analysis based upon the simple relation existing between the wave length of the X-Rays, the distance between atom planes in the crystal, and the angle of reflection.

There are many industrial applications of X-Ray analysis. Some of these are: (1) Identification and quantitative estimation of crystalline materials; (2) the manner in which cations and anions are linked together in a solution containing several ions; (3) differentiation of substances having same empiric formulas, e.g. quartz, trydimite, and cristobalite; (4) analysis of industrial dusts; (5) study of certain metallurgical operations, and (6) location of internal cracks in castings.

A meeting of the Pennsylvania Chapter was held at the Central Y. M. C. A. on Tuesday evening, January twenty-sixth.

At the close of an informal dinner Mr. H. F. Wakefield, Research Chemist, Development Laboratories, Bakelite Corporation, presented "Synthetic Resin Plastics". A brief synopsis of Mr. Wakefield's talk follows:

Nature was making plastics long before men set foot upon this earth of ours. Such natural products as amber, copal, and other fossil resins from prehistoric trees were used by ancient man and still find application today.

Organic plastics were known for many years, having resulted from side reactions in certain organic preparations; but these potentially useful products were disgustedly scraped from the flasks and beakers and thrown away.

In 1869 John Wesley Hyatt discovered celluloid by plasticizing gun cotton with camphor. Franchimont, in 1879, prepared cellulose acetate which, when plasticized, yielded a product of more desirable qualities than celluloid.

The first real advance in the synthetic plastics field came in 1907, when Dr. Leo H. Baekeland, trying to find a substitute for shellac, produced a hard durable resin by a reaction between phenol and formaldehyde.

Baekeland was more than a chemist engaged in pure research; he was far sighted enough to envision great things for his new product. He is reputed to have said that he went out looking for a rabbit and came home with a bear.

So it was that the modern synthetic plastics industry began. Today synthetic resins are being manufactured at the rate of some 150,000,000 pounds a year, almost half of which are of the phenol formaldehyde type.

Plastics may be divided into two classes; thermoplastic, which soften when heated; and thermosetting which, when heated to a sufficiently high temperature and then cooled, set to an infusible mass.

Synthetic resins may be fabricated by casting, by molding (hot, cold injection, and extrusion), and by a lamination process.

Some of the thousands of uses for modern plastics are: The manufacture of bath tub stoppers, imitation gems, flexible hose, pipe, transparent film, protective coatings, gears, venetian blinds, telephones, and cameras. The war has given us plastic PT boats, airplanes, and helmet linings.

For the future we see, among other things, all plastic automobiles and prefabricated houses.

Mr. Wakefield's lecture was amply illustrated with actual plastic materials.

Washington

President, L. F. Rader, Jr.

Vice-president, Donald H. Andrews *Treasurer,* L. R. Heiss

Secretary, Ernest J. Umberger

207 Albany Avenue, Takoma Park, Maryland

News Reporter to THE CHEMIST, T. H. Tremearne

Council Representative, Albin H. Warth

Chicago

Chairman, Vanderveer Voorhees *Vice-chairman,* Hilton I. Jones

Secretary-treasurer, Charles L. Thomas

Universal Oil Products Company

Riverside, Illinois.

The first 1943 meeting of the Chicago Chapter of THE AMERICAN INSTITUTE OF CHEMISTS was held January fifteenth at Huyler's Restaurant, 310 South Michigan Avenue. Before the meeting, copies of the proposed constitution had been mailed to the members, and at the meeting this constitution was adopted. Chapter dues of $1.00 per year were also voted.

After the business meeting, Dr. Egloff spoke a few words against the Kilgore bill S-2721. It is important that we be girded to fight any detrimental bill that may be introduced in the new Congress.

The group was then addressed by Mr. H. E. Wiedemann on "The Professional Chemist and Unionism." It seems quite clear that in their efforts to obtain and maintain closed shops, the large labor organizations are trying hard to bring the chemists into their unions. Many chemists consider themselves professional men and do not want to be unionized; in fact, they would believe that they had lowered their professional dignity by joining a union. Other chemists take the view that the chemist deserves treatment just as good as other workers in a plant and if a union can help him get more for his services, then he is willing to join a union. Still other chemists have been forced, by economic necessity, to join unions against their will. Whether by nature, by training, or both, the majority of chemists are notoriously poor in presenting their own case. There are too many chemists with a "whipped dog" complex.

The speaker admitted that he doesn't know the answer to all this, but he believes THE AMERICAN INSTITUTE OF CHEMISTS can and should do all possible to get the chemist to realize his

worth and demand it.

The discussion brought out several interesting points:

1. The chief chemist, in his anxiety to show a big profit for his division, is often responsible for the poor economic status of the chemists working for him. It would seem that he is also responsible sometimes for the "whipped dog" chemist. A chief chemist with more interest in raising the standing of his profession can eliminate this situation and still show a good profit for his division; often a higher profit.

2. The "routine" analyst is another problem. Many such chemists are "in a rut" in that they are doing the same job over and over every day. As they do their job it requires little originality or inventiveness. Is this worker in a rut because he has not had a chance to do better, because he has no originality, or because he is too bashful to speak his mind? It would seem that the routine analyst with little or no originality might be considered merely a skilled worker and not a professional man.

3. Dr. Otto Eisenschiml said that he was a member of two unions and that they seemed to be doing good work: (a) An author's union that looks after the author's interests in dealing with publishers to prevent withholding manuscripts from being published, stealing manuscripts, etc. (b) A playwrights' union to prevent similar abuses on plays.

Dr. Eisenschiml also said that when a $100 per month chemist makes $1000 per month profit for his employer, that was a fair profit. When a $100 per month chemist makes $10,000 per month profit for his employer, then the chemist is justly entitled to a share of the profits. The chemists could profit by having an organization that saw to it that he got that share. THE AMERICAN INSTITUTE OF CHEMISTS might well undertake such a task and still be within the bounds of helping the professional chemist.

(Editor's note: "The Chemist and the Union" by H. E. Wiedemann, on the above subject, appeared in the September, 1942, issue of THE CHEMIST.)

BOOKS

NEW TECHNICAL AND COMMERCIAL DICTIONARY, Spanish-English, English-Spanish. Compiled by Antonio Perol Guerrero; *Chemical Publishing Co., Inc.* 1942. De-luxe edition. 6" x 9", 600 pp. $10.00.

This important new dictionary was compiled by a prominent Spanish engineer. He has included all needed modern words referring to mechanics, mechanical engineering, aircraft aviation, shipbuilding, marine and naval terms, industrial chemistry plastics, meteorology, etc. Each word has been carefully translated in accordance with the plan of the Royal Spanish Academy of Languages and each definition contains as much information as possible. Many new words and their meanings, both English-Spanish and Spanish-English are listed which were not in existence a few years ago. It also includes conversion tables of weights and measures and monies together with their literal translations. This dictionary will be of interest to all technical and business men interested in Spanish, and to those who deal with Latin America.

The Association of Consulting Chemists and Chemical Engineers, Inc. has just issued the seventh revised edition of its "Classified Directory," which contains additional material over the previous edition. This directory may be obtained without charge by applying to the office of the Association, at 50 East 41st Street, New York, N. Y.

ORGANIC CHEMISTRY. By Frank C. Whitmore. *D. Van Nostrand Company, Inc.* 1942. 1080 pages. Price $7.50.

Dean Whitmore has successfully attempted a very difficult project—that of treating the whole of organic chemistry in a single volume. Thus the book is best characterized as a one-volume *Beilstein,* with emphasis more on completeness and factual information rather than on the theoretical discussion of the science. This information is taken largely from experimental work, supplemented by industrial reports from the literature and by the author's wide personal experience.

Some of the most useful features of the book are descriptions of methods of preparation of the more important compounds, with an indication of the best laboratory method; the attention paid to the newer products of organic chemistry; the extensive index, which includes explanations of references and abbreviations covering 121 pages. As an example of detail, there are twenty-six references under the heading "diazotization" and thirty-one under "dyes" in addition to the individual dyes listed elsewhere in the index.

The author assumes that the reader is thoroughly familiar not only with organic chemistry but with the literature of chemistry as well. The assumption has allowed the material to be highly condensed, saving necessary space. The author states that "the use of paper and pencil will be helpful in expanding many of the formulas and equations".

This book is proving extremely valuable, not only to the advanced student and the practicing chemist for whom it was intended, but to any chemist who has felt the long existing need for a single inclusive reference volume on organic chemistry.

MANUAL OF EXPLOSIVES, MILITARY PYROTECHNICS, AND CHEMICAL WARFARE AGENTS. By Jules Bebie. The Macmillan Company. 1943. 171 pp. 5" x 8½". $2.50.

This alphabetically arranged, ready reference book on explosives is handy and timely. In it are collected many facts which are not readily available. Any criticism of the failure to include some items is disarmed by the frank admission of the author that much more could have been included, but under the present war conditions was best left unpublished. The book is like a traffic signpost. It points the way to a more extensive search for greater detail. It is moreover written chiefly for the chemist, yet simply enough for anyone to understand.

Gas protection is but slightly touched upon though the various gases are described. Flame throwers are not

mentioned. Impressive is the evidence that the exigencies of war have driven explosives and gas manufacture from the early stages of mixing gunpowder to the highest arts of organic chemistry and its engineering.

A chronology is included, starting with gunpowder in Europe, (failing to mention Greek Fire), and continuing up to date. References to books, patents, articles in periodicals, bulletins, and catalogues are quite extensive and valuable. The cross referencing is exceptionally good. The book is what it purports to be, a ready reference to explosives and a guide to their names and combinations. It is worthy of a place on the ready-reference shelf.

Dr Robert J. Moore, F.A.I.C. prepared an address for the *New York Herald Tribune* Forum on current problems recently. His subject was "The Kingdom of Synthetics" in which he said that chemistry had added, "a fourth kingdom to the familiar group of animal, vegetable, and mineral kingdoms." This address appeared in full in the Sunday, November 22nd edition of the *New York Herald Tribune*.

Fortune Magazine for December carries an article entitled, "Dow Goes Down to the Sea". It brings out some little-known facts about the Dow Chemical Company's unique salt water empire.

CHEMISTS

Comptroller Lloyd Morey, of the University of Illinois, recently announced that in the last five years private organizations have given the university $1,337,937 to be used for research work; $343,340 of which was received for the 1941-42 fiscal year which ended on June 30th. From 1938 to 1942, annual gifts for research have increased more than 59 per cent, so that at the present time more than one hundred firms and organizations are financing more than one hundred and fifty coöperative research projects. These projects are those where the industry or other agency pays for the workers, materials, and necessary new equipment, while the university provides quarters, equipment on hand and skilled supervision. Each activity is covered by definite contract including the exact amount of funds, and an outline of the nature of the investigation, with the full control of the investigation and exclusive right to publish the results left in the hands of the university. Fourteen projects are of military nature of which the results must be kept secret.

Dr. E. A. Doisy, professor of biological chemistry at the School of Medicine of St. Louis University, received the annual award of distinction of the American Pharmaceutical Manufacturers' Association on December seventh at the Hotel Waldorf-Astoria, New York, N. Y. The presentation address was made by Torald H. Sollman, dean and professor of pharmacology and materia medica at the School of Medicine, Western Reserve University. The award was

made in recognition of Dr Doisy's isolation in pure form of the female sex hormone estrone (theelin) and other valuable contributions to knowledge of estrogenic substances important in therapy and research.

The Society of Rheology and The Polytechnic Institute of Brooklyn

take pleasure in inviting you to attend a research conference

on

"The Present State of the Kinetic Theory of Rubber Elasticity".

to be held on Saturday, April 3, 1943 at 10:30 a.m. at the Polytechnic Institute of Brooklyn, 99 Livingston Street, Brooklyn, N. Y. The program is as follows:

10:30 a.m. Dr. M. L. Huggins, Eastman Kodak Company Research Laboratory, Rochester, N. Y.: "Statistical Treatment of Long Chain Molecules."

12:00 noon. Discussion.

1:00 p.m. Luncheon in the Institute.

2:00 p.m. Dr. W. L. Wood, National Bureau of Standards, Washington, D. C.: "Present Experimental Aspect of Rubber Elasticity."

3:30 p..m Discussion.

Special invitations to contribute to the discussion have been extended to Drs. T. Alfrey, N. Bekkedahl, C. W. Bunn, W. T. Busse, G. L. Clark, H. Eyring, J. E. Field, P. J. Flory, C. S. Fuller, S. D. Gehman, E. Guth, H. M. James, A. R. Kemp, E. Mack, M. Mooney, R. Simha, L. W. G. Treloar, R. F. Tuckett, E. Valko, and F. T. Wall.

The Society and the Institute hope that at least some of these outstanding contributors to the subject under consideration will be able to attend.

Dr. Gustav Egloff, President A.I.C., addressed the Virginia Section of the American Chemical Society, January eighth, in Richmond, and the Virginia Blue Ridge Section of the American Chemical Society, January ninth, in Roanoke, on "Substitute Fuels in a World at War". He discussed briefly the history of the development of various types of substitute fuels by Germany, the lead of such development "by necessity". He reported on the yields of such fuels, and compared the operation of plants producing such fuels to petroleum refineries as to labor required, costs of construction and operation, and other factors. He then considered the usage of compressed gases, of Producer gas from various sources, the necessity of high grade alloys for cylinders, and the lack of wood and charcoal for Producer gas in countries where usage was more widespread, as in France and Italy. He also discussed the vital factors in economics based on substitution and the beginnings of the failure of such factors in present "ersatz" economy.

The Polytechnic Institute of Brooklyn announces that Dr. I. Fankuchen, formerly of Cambridge University, England, has been appointed to the Graduate Teaching Staff for the present academic year. Dr. Frankuchen is presenting a combined lecture and laboratory course on "Chemical Analysis by X-ray and Electron Diffraction Methods".

Corning Glass Works announces that the Army-Navy Production Award for Excellence in War Production was presented to the men and women of the Corning Divisions on February fourth.

Ross Aiken Gortner

Dr. Ross Aiken Gortner, chief of the Division of Bio-chemistry at the University of Minnesota, died on September 30, 1942, at the age of fifty-seven.

Dr. Gortner was born at O'Neill, Nebraska. He received his B.S. degree from Nebraska Wesleyan in 1907, the M.A. degree from the University of Toronto; the Ph.D. degree from Columbia University, and the honorary D.Sc. degree from Lawrence College After five years in the Station for Experimental Evolution at Cold Springs Harbor, Long Island, he came to the University of Minnesota in 1914 as associate professor of soils. In 1917 he was made full professor and chief of the division of biochemists of that University, a position which he held at the time of his death.

Dr. Gortner's scientific interests were very broad. His scientific papers number over three hundred on subjects such as the melanins, chemistry of embryonic growth, physico-chemical properties of plant saps, the organic matter of soils, the humins and other protein products, the physical and colloidal properties of wheat flour, electrokinetics, water in living processes, and the chemistry of wood and the pulping process. He was the author of "Outlines of Bio-chemistry" and "Selected Topics in Colloid Chemistry".

H. R. Hammer, F.A.I.C., director of research of the American Tobacco Company, is chairman of the Virginia Section of the American Chemical Society.

U. S. Civil Service

Paint inspectors are sought by the United States Civil Service Commission, according to a recent announcement. The expanding facilities of the United States Maritime Commission in the construction of cargo and war-purpose ships and the production of materials for them has created a need for additional inspectors. Persons with technical experience in the manufacture of paints and other products are wanted. Inspections must be made at place of manufacure and at point of delivery of various types and grades of marine paints; paint removers, primers, varnishes, enamels, rust preventatives; animal, vegetable, and mineral oils and pigments. Positions pay $2600 a year. Formal education in chemistry is desirable but sufficient experience to overcome the lack of this will be accepted. There are no age limits and no written test is required. Applications must be filed with the United States Civil Service Commission, Washington, D. C. Announcement 270 covering these requirements may be obtained from first and second class post offices, or from the Commission.

A meeting of the New York Branch of the American Pharmaceutical Association was held on January 11, 1943 at the Brooklyn College of Pharmacy, Long Island University, Brooklyn, New York. The speaker was C. G Weigand, M.D. of the Medical Department of Eli Lilly and Company. His subject was "The Practical Application of Vitamin Therapy". A lantern slide discussion was held on topics connected with vitamins.

Dr. J. Mitchell Fain has been granted a leave of absence for the duration from his duties as Chemical engineer at Foster D. Snell, Inc., Brooklyn, New York. Major Fain has been called to active duty in the Chemical Warfare Service and is now stationed at the Chemical Warfare School, Edgewood Arsenal, Maryland.

The Association of Consulting Chemists and Chemical Engineers, Inc., 50 East 41st Street, New York, N. Y., announces that it has established a clearing house for consultants as a free service, to refer those who ask for assistance to consultants specializing in any given field.

Konrad F. Wittmann, of Pratt Institute, Brooklyn, N. Y. in collaboration with the Technical Faculty has prepared an *Industrial Camouflage Manual*, which is listed as the first book in industrial camouflage published in America. The price is $4.00.

Metallurgy Training for Women

The first war-training course in metallurgy, established exclusively for women, opened September twenty-first at the Illinois Institute of Technology, Chicago, Illinois. Since March, the Institute has trained several hundred women in ordnance inspection, industrial drafting, and industrial chemistry.

Meeting Dates—1943

March 30—Meeting of the Pennsylvania Chapter of THE AMERICAN INSTITUTE OF CHEMISTS, Philadelphia, Penna. Dr. Gustav Egloff, "The Chemist and His Profession".

April 11-16—American Chemical Society. Spring Meeting. Detroit, Michigan.

April 16—Meeting of National Council of THE AMERICAN INSTITUTE OF CHEMISTS. The Chemists' Club, New York, N. Y. 4 P. M.

April 16—Meeting of the New York Chapter of THE AMERICAN INSTITUTE OF CHEMISTS. The Chemists' Club, 52 East 41st Street, New York, N. Y. Student Medals to be presented. "Training of the Industrial Chemist." Speaker to be announced.

April 20-24—Meeting. The American Chemical Society, Memphis, Tenn.

May 11-13—Meeting. The American Institute of Chemical Engineers, Boston, Mass.

May 15—Annual Meeting. THE AMERICAN INSTITUTE OF CHEMISTS. Edgewater Beach Hotel, Chicago, Illinois. Program to be announced in the March issue of THE CHEMIST.

May 21—Meeting of the New York Chapter of THE AMERICAN INSTITUTE OF CHEMISTS. The Chemists' Club, 52 East 41st Street, New York, N. Y. "Ancient Fabrics and Their Application in Modern Design." M. D. C. Crawford, of Fairchild Publications, New York, N. Y.

Sept. 6-10—American Chemical Society. 106th Meeting. Minneapolis, Minnesota.

Dec. 28-30—American Chemical Society. Organic Chemistry Symposium. Boston, Mass. Tenth National Symposium.